VIII. The accessory ossicles developed in its vicinity, which are six. One, a detached portion of the lachrymal itself, with a second ossific centre (ossiculum hamuli); one, a detached portion of the os planum behind it (ossiculum ethmo-lachrymale superius); two, which are detached nodules connected with the maxilla (ossiculum ethmo-lachrymale inferius and ossiculum canalis naso-lachrymale); one, which belongs to the system of the jugal bone (ossiculum infra-orbitale); and one, a detachment of the nasal process of the maxilla (ossiculum maxillo-frontale). To this last-named the sutura notha is always related.

IX. The history of the development of the human lachrymal from its first appearance in the eighth week, and the changes in position and slope shown by it.

X. The racial varieties shown by this bone, and the system of inter-lachrymal indexes whereby the degree of downward divergence and orbital splay of the bone can be measured.

XI. Comparative anatomy and morphology of the bone. Those points have been briefly referred to which help to interpret the human conditions.

II. "On the Electro-Chemical Equivalent of Silver, and on the Absolute Electromotive Force of Clark Cells." By Lord Rayleigh, D.C.L., F.R.S. Received March 17, 1884.

(Preliminary Notice.)

The investigations upon this subject which have been carried on by Mrs. Sidgwick and myself during the last year and a half, though not yet quite finished, are so far advanced that no doubt remains as to the general character of the results; and as these results have application in the daily work of practical electricians, it is thought desirable to communicate them without further delay.

The currents are measured by balancing the attraction and repulsion of coaxal coils against known weights, as described before the British Association in 1882, a method which has fully answered the favourable expectations then expressed. To what was said on that occasion it will be sufficient for the present to add that the readings are taken by *reversal* of the current in the fixed coils, and the difference of weights thus found (about 1 gram) represents the double force of attraction, free from errors depending upon the connections of the suspended coil, and other sources of disturbance.

The difficulties which have been experienced, and which have been the cause of so much delay, have related entirely to the behaviour of the silver voltameters, of which never less than two, and sometimes

as many as five, have been included in the circuit of the measured current. In order to render the deposit more compact, and thus to diminish the danger of loss in the subsequent manipulations, *acetate* of silver was added in the earlier experiments to the standard solution of nitrate. Experience, however, has shown that the principal risk is not in the loss of metal, but in the obstinate retention of salt within the fine pores of the deposit, leading to an over-estimate of the amount. When the texture is very compact this danger increases, and deposits from a solution containing acetate are often decidedly too heavy, even after the most careful and protracted washings. On heating to low redness a portion, at any rate, of the retained salt is decomposed, NO_3 is driven off, and a loss of weight ensues. With pure nitrate, to which we finally recurred, the risk is much less.

The actual weights of deposited silver were usually from 2 to 3 grms., and, so far as the mere weighings are concerned, should have been correct to $\frac{1}{10000}$. Discrepancies three or four times as great as this are, however, actually met with, whether due to retention of salt or to loss of metal it is difficult to say. The final number, expressing in C.G.S. measure the electro-chemical equivalent of silver, is a little lower than that ($1\cdot119 \times 10^{-2}$) given on a previous occasion ("Cambridge Proceedings" for November 26, 1883). It approximates closely to $1\cdot118 \times 10^{-2}$, and is thus in precise agreement with the number announced within the last few weeks by Kohlrausch, viz., $1\cdot1183 \times 10^{-2}$. Its substantial correctness can therefore hardly be doubted, more especially as it does not differ very much from the number (1·124) obtained by Mascart. In terms of practical units, we may say that the ampère current deposits per hour 4·025 grms. of silver.

When we are provided with means for the absolute measurement of currents, the determination of electromotive force is a very simple matter if we assume a knowledge of absolute resistance. A galvanic cell is balanced against the known difference of potentials generated by a known current in traversing a known resistance. The difficulty relates entirely to the preparation and definition of the standard cells. A considerable number of Clark cells have been set up and tested at intervals during the last six months, and their behaviour has been satisfactory, the extreme range (after the first ten days) not much exceeding $\frac{1}{1000}$. A modified form of cell in which the solid zinc is replaced by an amalgam, is at present under trial.

In Mr. Latimer Clark's own determination the B.A. unit is assumed to be correct, and the E.M.F. of the cell at 15° C. was found to be 1·457 volt. *On the same assumption*, we obtain the not greatly differing value 1·453 volt. If we take the true value of the B.A. unit as ·9867 ohm, 1·453 will be replaced by 1·434.

Experiments are also in progress to determine in absolute measure

the rotation of the plane of polarisation of light in bisulphide of carbon under the action of magnetic force. Of the results obtained by Gordon and Becquerel, differing by about 9 per cent., our preliminary measurements tend rather to confirm the former.

III. "On the Natural and Artificial Fertilisation of Herring Ova." By J. Cossar Ewart, M.D., Regius Professor of Natural History in the University of Edinburgh. Communicated by The President. Received March 19, 1884.

It is well known that for centuries herring have been in the habit of congregating on inshore banks around the coast of Britain in order to deposit their spawn.

In 1862 the Royal Commission (of which Professor Huxley was a member) appointed to report on the trawling for herrings on the coast of Scotland, arrived at the conclusion that herring visit our shores for this purpose twice a year, some shoals arriving during the autumn, while others make their appearance during the winter. The herring which spawn during the autumn (and which at another time I shall endeavour to show differ from the winter herring) chiefly frequent banks on the east coast, while the herring which spawn during winter are most abundant on the west coast.

Of the west coast spawning-grounds, the Ballantrae Bank, which lies off the coast of Ayrshire, is one of the most important and is certainly the most famous. To this bank herring are known to have resorted for at least 200 years, always bringing in their train numerous codfish, whiting, and sometimes shoals of dogfish, porpoises, and dolphins, and while on the bank they have afforded an abundant harvest to the fishermen of the surrounding districts, and to the flocks of gannets and gulls which people Ailsa Craig.

The herring fishery being one of the most important industries in Scotland (the autumn fishery engaging nearly half-a-million people, and being worth in good years about 2,500,000*l.* sterling), there has been since 1809 a Board specially charged with guarding its interests. This Board (formerly known as the Board of Fisheries, but since 1882 as the Fishery Board for Scotland) in 1862–63 endeavoured, under the direction of Professor Allman (then a member of the Board), to gain some information as to the habits of the herring, and more especially as to the nature of the spawn and the spawning grounds. Since 1863 little has been done in this country by way of continuing these experiments until last autumn, when the new Fishery Board, recognising the importance of the investigations so ably initiated by Professor Allman, appointed a Committee of its